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# Preface

The *Environmental Report 1998* is prepared for the U.S. Department of Energy (DOE), as required by DOE Order 5400.1 and DOE Order 231.1, by the Environmental Protection Department at the Lawrence Livermore National Laboratory (LLNL). The results of LLNL's environmental monitoring and compliance efforts and an assessment of the impact of LLNL operations on the environment and the public are presented in this publication.

Two important changes have been made in the 1998 report. First, a new chapter, Chapter 8: Ground Water Investigation and Remediation has been added to more thoroughly cover Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) efforts to remove contamination from ground water at the Livermore site and Site 300. Second, soil and sediment analysis for metals and organic compounds that is part of the Ground Water Protection Plan, previously reported in the Ground Water chapter, will now be found in Chapter 10, Soil and Sediment Monitoring.

To produce a more readable and useful document for our diverse readership, which includes regulators, scientists and engineers, educators, the media, public interest groups, and interested citizens, we have divided this report into two volumes: main volume and Data Supplement. The main volume describes LLNL's environmental impact and compliance activities and features descriptive and explanatory text, summary data tables, and plots showing data trends. The summary data include measures of the central tendency of the data (i.e. mean and medium), their spread or variability, and their extreme values. The main volume contains the Executive Summary and the Compliance Summary; it features individual chapters on monitoring of air, sewage, surface water, ground water, soil and sediment, vegetation and foodstuff, and environmental radiation; and it contains chapters on site overview, environmental program information, ground water investigation and remediation, radiological dose assessment, and quality assurance. Information on both the Livermore site and Site 300 is presented in each chapter. The Data Supplement provides individual data points, where applicable, some summary data, and more detailed accounts of sample collection and analytical methods.

The main volume contains the information of interest to most of our readers and will be distributed. The Data Supplement will be sent only upon request; a card for this purpose is included on the last page of this volume. Both the main volume and the Data Supplement are available on the Internet at <http://www.llnl.gov/saer>.

As in our previous annual reports, data are presented in Système International (SI) units. In particular, the primary units we use for radiological results are becquerels and sieverts for activity and dose, respectively, with curies and rem used secondarily ( $1 \text{ Bq} = 2.7 \times 10^{-11} \text{ Ci}$ ;  $1 \text{ Sv} = 100 \text{ rem}$ ). If the data are available, radioactivities are reported as the measured concentration with an uncertainty ( $\pm 2\sigma$  counting error); if not, they are reported as being less than a detection limit. If the concentration is less than the uncertainty, the result is considered to be indistinguishable from a zero concentration. Units are discussed in Supplement 13-1 of Chapter 13, Radiological Dose Assessment, and in Chapter 14, Quality Assurance, in the main volume.

This document is the responsibility of the Operations and Regulatory Affairs Division of the Environmental Protection Department. Monitoring data were obtained through the combined efforts of the Operations and Regulatory Affairs Division, Environmental Restoration Division, the Chemistry and Materials Science Environmental Services Laboratories, and the Hazards Control Department of LLNL. Special recognition is deserved for the dedication and professionalism of the technicians who carried out environmental monitoring—Gary A. Bear, David J. Castro, Paul C. Dickinson, David L. Graves, Charles Hunt, Renee Needens, Terrance W. Poole, Donald G. Ramsey, and Robert Williams—and to the data management personnel—Jennifer Clark, Kimberly A. Stanford, Louise Morris, Beth Schad, Suzanne Chamberlain, Connie Wells, Della Burruss, and Susan Lambaren. Betty Cuevas provided secretarial support and collated and distributed drafts.

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